2ST3360

Hi-Rel NPN and PNP bipolar transistor 60 V, 0.8 A

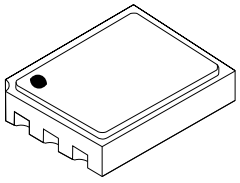
Datasheet — production data

Features

Polarity	BV_{CEO}	I_C (max)	h_{FE}(1)
NPN	60 V	0.8 A	160
PNP	-60 V	- 0.8 A	160

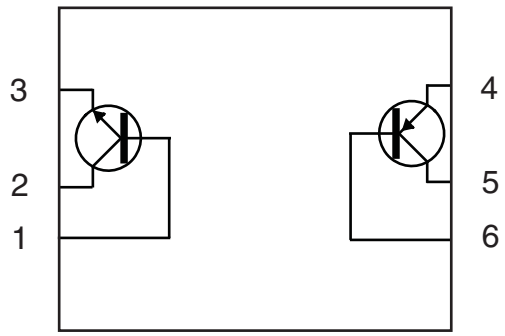
1. @ Ic = 1 A and V_{CE} = 2 V.

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast-switching speed: FT= 130 MHz
- Hermetic package
- Manufactured according to ESCC 5000 specifications
- 100 krad low dose rate



LCC-6

Figure 1. Internal schematic diagram



Applications

- Power MOSFET drivers

Description

The 2ST3360 power bipolar transistor is a fast dual complementary device (NPN and PNP) housed in a single LCC-6 hermetic Hi-Rel package, specifically designed for aerospace Hi-Rel applications. Its radiation hardness allows key parameters such as gain and leakage current to stay at best-in-class post irradiation levels. ST proprietary technology also results in a high degree of electrical performance for both transistors in the pair. The high switching performance of each make this device particularly suitable for power MOSFET driver applications.

Table 1. Device summary(1)

Order code	ESCC part number	Quality level	Radiation level	Package	Lead finish	Mass	EPPL
2ST3360U1	-	Engineering model	-	LCC-6	Gold	0.20 g	-

1. Contact ST sales office for information about the specific conditions for tape and reel packing.

This is information on a product in full production. www.st.com

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1 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		NPN	PNP	
V_{CBO}	Collector-base voltage (I_E = 0)	60	-60	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	60	-60	V
V_{EBO}	Emitter-base voltage (I_C = 0)	6	-6	V
I_C	Collector current	0.8	-0.8	A
I_{CM}	Collector peak current (t_P < 5 ms)	4	-4	A
I_B	Base current	0.2	-0.2	A
I_{BM}	Base peak current (t_P < 5 ms)	0.4	-0.4	A
P_{TOT}	Total dissipation at T_{amb} = 25 °C	1.4		W
T_{stg}	Storage temperature	-65 to 200		°C
T_J	Max. operating junction temperature	200		°C

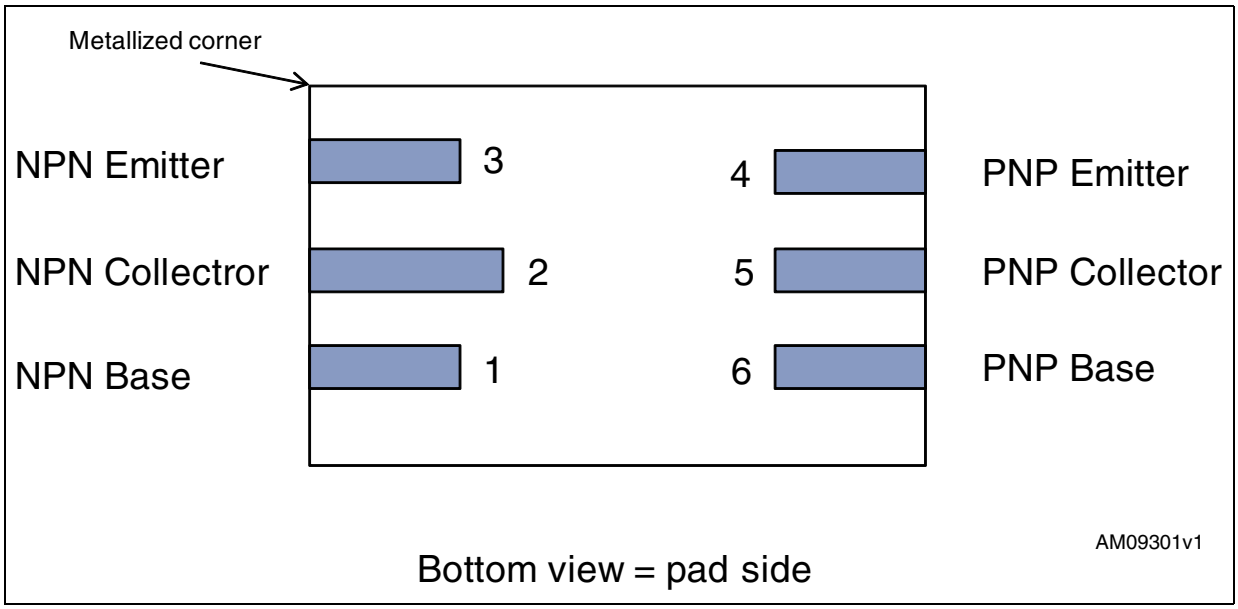
Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJA}	Thermal resistance junction-ambient max	125	°C/W

Note: Mounted on a 15 x 15 x 0.6 mm ceramic substrate.

2 Pin configuration

Figure 2. Pin connections



3 Electrical characteristics

T_{CASE} = 25 °C; unless otherwise specified.

Table 4. Electrical characteristics for NPN

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current (I_E = 0)	V_{CB} = 60 V V_{CB} = 60 V, T_A = 110 °C			100 10	nA µA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 6 V			100	nA
$V_{BE(on)}$	Base-emitter on voltage	V_{CE} = 2 V I_C = 100 mA		650		mV
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 0.8 A I_B = 40 mA I_C = 2 A I_B = 100 mA		250 550		mV
h_{FE} (1)	DC current gain	I_C = 100 mA V_{CE} = 2 V I_C = 1 A V_{CE} = 2 V	80 160		400	
 t_d t_r t_s t_f	Resistive load Delay time Rise time Storage time Fall time	 I_C = 2 A V_{CC} = 10 V $I_{B(on)}$ = - $I_{B(off)}$ = 200 mA $V_{BE(off)}$ = - 5 V		 20 70 830 67		 ns ns ns ns
f_T	Transition frequency	I_C = 0.1 A V_{CE} = 10 V		130		MHz

1. Pulse test: pulse duration ≤300 µs, duty cycle ≤2%

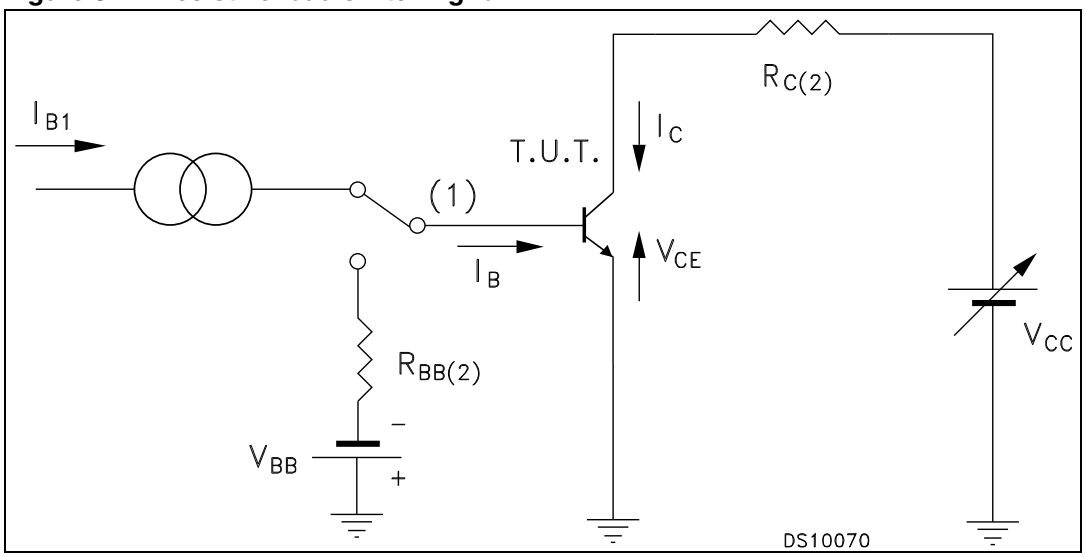
Table 5. Electrical characteristics for PNP(1)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current (I_E = 0)	V_{CB} = 60 V V_{CB} = 60 V, T_A = 110 °C			100 10	nA µA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 6 V			100	nA
$V_{BE(on)}$	Base-emitter on voltage	V_{CE} = 2 V I_C = 100 mA		650		mV
$V_{CE(sat)}$ (2)	Collector-emitter saturation voltage	I_C = 0.8 A I_B = 40 mA I_C = 2 A I_B = 100 mA		250 550		mV
h_{FE} (1)	DC current gain	I_C = 100 mA V_{CE} = 2 V I_C = 1 A V_{CE} = 2 V	80 160		400	
 t_d t_r t_s t_f	Resistive load Delay time Rise time Storage time Fall time	 I_C = 2 A V_{CC} = 10 V $I_{B(on)}$ = - $I_{B(off)}$ = 200 mA $V_{BE(off)}$ = - 5 V		 22 54 360 42		 ns ns ns ns
f_T	Transition frequency	I_C = 0.1 A V_{CE} = 10 V		130		MHz

1. For PNP type, voltage and current values are negative.
2. Pulse test: pulse duration ≤300 µs, duty cycle ≤2%

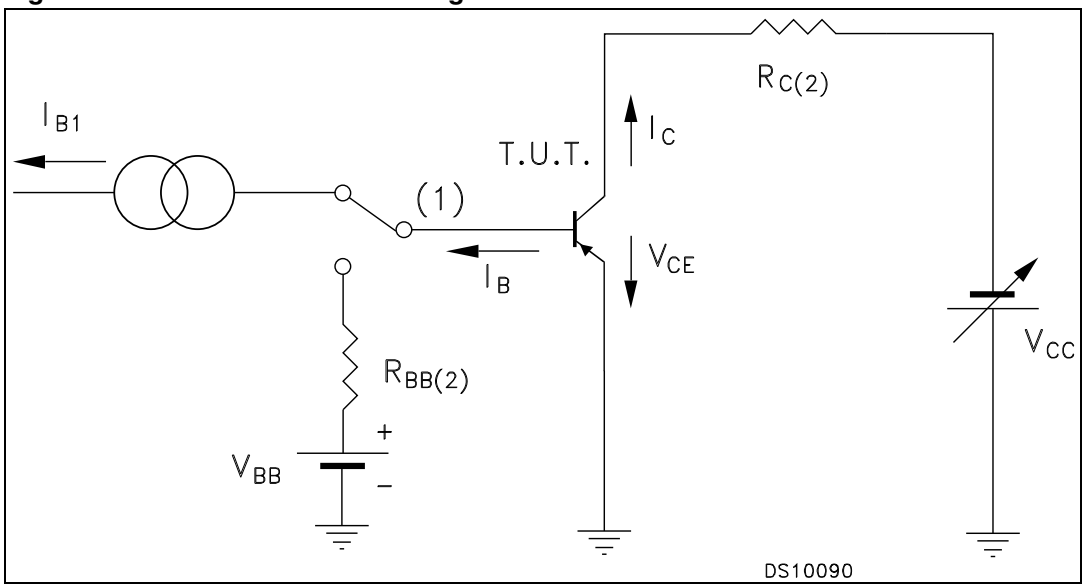
3.1 Test circuits

Figure 3. Resistive load switching for NPN



1. Fast electronic switch
2. Non-inductive resistor

Figure 4. Resistive load switching for PNP



1. Fast electronic switch
2. Non-inductive resistor

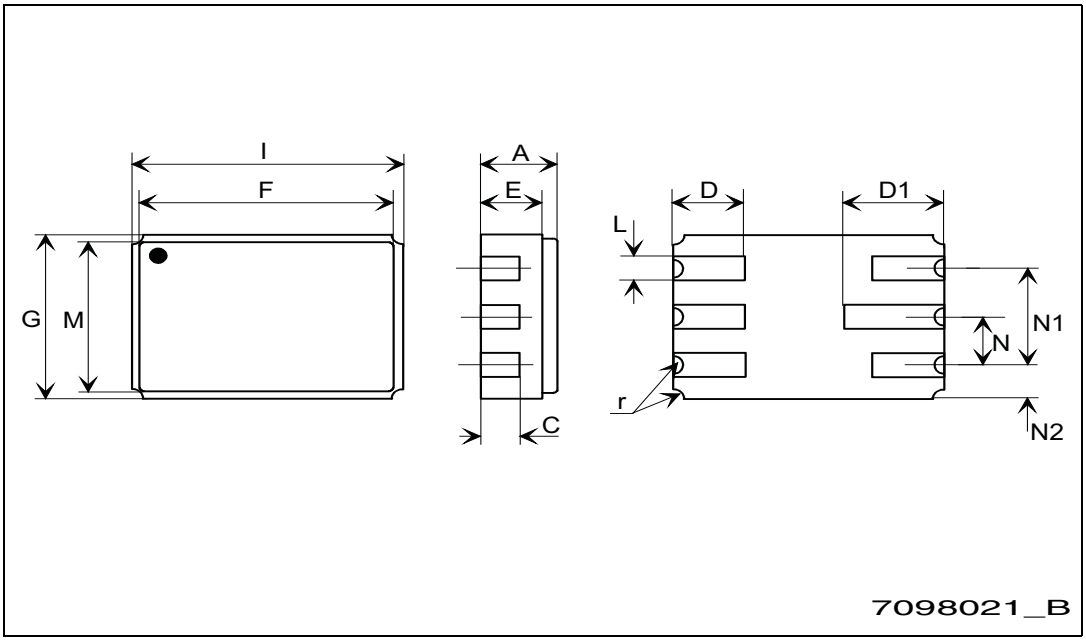
4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Table 6. Ceramic leadless chip carrier 6 mechanical data

mm.				inch.		
Dim.	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.53		1.96	.060		.077
C	0.78	0.89	0.99	.031	.035	.039
D	1.52	1.65	1.78	.060	.065	.070
E	1.24	1.40	1.55	.049	.055	.059
F	5.77	5.84	5.92	.227	.230	.233
G	4.19	4.31	4.45	.165	.170	.175
I	6.10	6.22	6.35	.240	.245	.250
L	0.56	0.63	0.71	.022	.025	.028
M	3.86	3.94	4.01	.152	.155	.158
N	1.14	1.27	1.40	.045	.050	.055
N1	2.41	2.54	2.67	.095	.100	.105
N2	0.64	0.89	1.14	.025	.035	.045
r		0.23			.009	
D1	2.08	2.28	2.49	.082	.090	.098

Figure 5. Dimensions for ceramic leadless chip carrier 6



5 Order code

Table 7. Ordering information(1)

Order code	ESCC part number	Quality level	Radiation level	Package	Lead finish	Marking	EPPL	Packing
2ST3360U1	-	Engineering model	-	LCC-6	Gold	2ST3360U1	-	Wafflepack

1. Contact an ST sales office for information regarding the specific conditions for tape and reel packing.

6 Revision history

Table 8. Document revision history

Date	Revision	Changes
18-Jul-2011	1	Initial release.
01-Feb-2012	2	*Section 2.* inserted.
04-May-2012	3	Updated $V_{CE(sat)}$ value and test condition in *Table 4: Electrical characteristics for NPN* and *Table 5: Electrical characteristics for PNP*.

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